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Growth and Yield Response of Mungbean (*Vigna radiata* L.) to Different Seed Rates and Levels of Phosphorus

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Abstract

The studies were undertaken to investigate the response of mungbean cultivar NM-92 to different seed rates and phosphorus levels. Seeding rate of 25 kg ha^{-1} resulted in significantly maximum seed yield of 861.70 kg ha^{-1}. Similarly, maximum seed yield of 961.90 kg ha^{-1} was obtained by applying 85 kg P_2O_5 ha^{-1} which was, however, statistically similar to the seed yield of 868.4 kg ha^{-1} obtained with 60 kg P_2O_5 ha^{-1}.

Introduction

Mungbean (*Vigna radiata* L.) is an important pulse crop of Pakistan. There is a large gap between potential yield of mungbean and actual yield being obtained by farmers. Increase in yield of a crop on an exhausted soil is only possible with the use of adequate level of inputs in the proportionate manner along with other improved cultural practices. Optimum seed rate is considered an important input for having increased yield of mungbean per hectare. Phosphorus also has significant effect on the growth and yield of mungbean. Sarwar (1988) reported that yield components were significantly increased by the application of NPK at the rate of 30-90-30 kg ha^{-1} to mungbean. Banasri *et al.* (1989) noted in a pot experiment that the dry matter yield increased significantly with increasing levels of phosphorus. However, Dongale and Kadrekar (1991) conducted an experiment on green gram (*Vigra radiata* L.) grown on Phosphorus deficit soil. P was applied @ 0, 8.7, 17.4, 26.1 and 34.8 kg ha^{-1}. P application increased P uptake and also increased *Vigna radiata* seed yield from 0.53 t ha^{-1} (without P) to 0.84 t with 17.4 kg P. While Kushwaha and Singh (1992) applied 0-75 kg P_2O_5 ha^{-1} to *Vigna radiata* by three different methods of application. Seed yield increased upto 50 kg P_2O_5 ha^{-1} but was not affected by the method of application. Whereas, Ali (1993) applied 0, 28, 56 and 84 kg P_2O_5 ha^{-1} to mungbean. He observed that plant stand per unit area, plant height and number of branches per plant were not affected by different phosphorus levels, whereas, seed yield, number of pods per plant, number of seeds per pod and 1000-seed weight were significantly affected by all Phosphorus levels. Sharma and Singh (1993) fertilized *Vigna radiata* @ 0, 20, 40, 60 kg S and 0, 25, 50, 75 kg P ha^{-1}. Highest seed yield (1.28 t ha^{-1}) was obtained with 50 kg P and 40 kg S ha^{-1}, respectively. Jain and Rathore (1994) grew green gram (*Vigna radiata*) using seed rate of 20 and 25 kg ha^{-1}. The increase in seed rate increased seed yield (331 vs 281 kg ha^{-1}).

Since present study was undertaken to evaluate growth and yield response of mungbean genotype NM-92 to different seed rates and levels of phosphorus under irrigated conditions at Faisalabad.

Materials and Methods

A field experiment with split plot design randomizing seed rates in main plots and phosphorus levels in sub plots was conducted at the Agronomic Research Area, University of Agriculture, Faisalabad during August, 1996. The net plot size measured 1.5 m x 6m. The soil was loamy with pH 8.6. Nitrogen, available phosphorus and potash were 0.03%, 4.6 ppm and 150 ppm, respectively. Moong variety NM-92 was sown in 30 cm spaced rows with a single row hand drill using seed rates of 20, 25 and 30 kg ha^{-1}. Phosphorus was applied @ 0, 35, 60 and 85 kg ha^{-1}. Whole of P as per treatment and basal dose of N (25 kg ha^{-1}) was mixed and side drilled along with seed rows immediately after seeding. All other cultural practices were done uniformly in all the plots. Observations were recorded on plant parameters like plant population, number of pods per plant, number of seeds per pod, 1000-seed weight and seed yield using standard procedures. Data collected was analysed using analysis of variance technique and least significant difference (LSD) test was employed at 0.05 probability to compare the differences among treatment means (Steel and Torrie, 1984).

Results and Discussion

Plant population was significantly affected by seed rates, whereas, fertilizer application had non-significant effect on plant population. Seed rate of 30 kg ha^{-1} gave maximum plant population. This was because plant population increases with an increase in seed rate. Maximum number of pods per plant were obtained with seed rates of 25 and 20 kg ha^{-1} which were statistically at par with each other. Maximum number of pods per plant were obtained with the application of 85 kg P_2O_5 ha^{-1} which was, however, statistically at par with that of 15.11 pods per plant obtained with 60 kg P_2O_5 ha^{-1}. Similar observation was made by Ali (1993). Number of seeds per pod were not significantly affected by both seed rates as well as phosphorus levels. This was probably due to the genetic character of the crop.

Table 1: Mungbean performance under different seed rates and phosphorus levels.

	Plant population /plot	No. of pods per plant	No. of seeds per pod	1000-seed weight (g)	Seed yield per ha (kg)
Seed Rate (Kg ha^{-1})					
20	200.30 c	14.69 a	10.08^{NS}	32.35^{NS}	799.0 b
25	248.60 b	15.00 a	10.21	32.73	861.7 a
30	319.20 a	12.21 b	9.81	31.83	770.1 b
Phosphorus Levels					
0	253.21^{NS}	12.51 c	9.20^{NS}	29.52 c	701.1 c
35	253.66	13.77 b	9.88	31.94 b	783.1 b
60	257.22	15.11 a	10.29	33.13 ab	868.4 a
85	258.44	15.42 a	10.76	33.76 a	961.9 a

Seed rates did not affect 1000-seed weight significantly, whereas, fertilizer treatments showed a significant effect on it. 1000-seed weight increased with the increase in phosphorus levels and maximum 1000-seed weight (33.76 g) was obtained with the application of 85 kg P_2O_5 which was, however, statistically at par with 33.13 g obtained with 60 kg P_2O_5 ha^{-1}.

Both seed rates and P_2O_5 levels had significant effect on seed yield. A seed rate of 25 kg ha^{-1} gave maximum seed yield of 861.7 kg ha^{-1}, whereas, 85 kg P_2O_5 ha^{-1} gave maximum seed yield of 961.90 kg ha^{-1} which was, however, statistically similar to the yield obtained with 60 kg P_2O_5 ha^{-1} (868.40 kg ha^{-1}). These results are in line with those of Banasri *et al.* (1989).

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